

REMARKS

The Office Action dated August 10, 2005, has been received and carefully noted. The following remarks are submitted as a full and complete response thereto. Claims 4 and 10-20 are pending and respectfully submitted for consideration.

Claims 4 and 13-20 were rejected under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over Lovercheck (U.S. Patent No. 4,424,771) in view of Negishi (U.S. Patent No. 6,165,633) and Marion et al. (U.S. Patent No. 4,394,137, "Marion"). Lovercheck was cited for disclosing many of the claimed elements of the invention with the exception of use of mixed water-methanol and an electronic control unit that controls the switching means so as to supply the mixed fuel solution from the second mixed water-methanol solution tank to the evaporator when starting and/or stopping the methanol reforming apparatus. Negishi and Marion were separately cited for curing this deficiency. The Applicants traverse the rejection and respectfully submit that claims 4 and 13-20 recite subject matter that is neither disclosed nor suggested by Lovercheck, Negishi, and Marion, either singly or in combination. As such, the Applicants respectfully submit that claims 4 and 13-20 are allowable over the cited art.

The present invention, as claimed in claim 4, enables switching of the concentration of the mixed water-methanol solution instantaneously and starting/stopping of the reforming apparatus quickly, while preventing the development of high-rate reaction regions by using the second mixed water-methanol solution tank, which is a tank other than the first mixed water-methanol solution tank used for normal operation. The electronic control unit controls the switching means so as to supply the

water-methanol solution of the second tank to the evaporator when starting and/or stopping the methanol reforming apparatus.

Lovercheck discloses a fuel system 1 having a catalyst containing reactor 30 and a by-pass conduit 2. Liquid alcohol is stored in the liquid alcohol storage tank 3. From the liquid alcohol storage tank 3, liquid alcohol is conveyed in a liquid alcohol conduit 4 by a pump 5 to a vaporizer feed line 6 and a by-pass conduit 2. Liquid alcohol passes from the vaporizer feed line 6 through a solenoid valve 7 and into the vaporizer 8. The vaporizer 8 is heated by engine coolant, which enters the vaporizer 8 through a vaporizer heat transfer feed line 9. From the vaporizer, the engine coolant returns to the engine through a vaporizer heat transfer fluid output line 10. The vaporized alcohol is conveyed from the vaporizer 8 to the liquid trap 11 by a line 12 and from the liquid trap 11 through a line 13 to the catalyst containing reactor. See column 3, lines 53-67. The preferred alcohol for use in the fuel system is methanol. See column 5, lines 3-4. When more than one fuel tank is used, a selector switch 48, which provides for the selection of which fuel is to be used, is provided by control of the feed valves from the storage tank for each fuel. In this embodiment, the valve 47 is in the line 4 between the pump 5 and the storage tank 3. Additionally, the additional storage tank 44 is connected to the line 4 by another line 45. The valve 46 is in the line 45 connecting the additional storage tank 44 to the line 4. The valve 47 is in the line 4 between the storage tank 3 and the line 45 connecting the line 4 with the additional storage tank 44. The selector switch 48 controls the valves 46 and 47 to proportion each fuel used or to select which fuel is used alone. The additional tank 44 preferably contains gasoline. See column 7, lines 29-43.

Negishi discloses that a methanol flow path 70, through which a supply of methanol is fed as the raw fuel from the methanol tank 28 to the evaporator 24, is provided with a second pump 64 that functions to adjust the quantity of methanol supplied to the evaporator 24. The second pump 64 is electrically connected to the control unit 50 and is driven by signals output from the control unit 50 to regulate the quantity of methanol supplied to the evaporator 24. See column 13 lines 40-47.

Marion discloses a partial oxidation process for continuously producing synthesis gas, fuel gas or reducing gas, in which process one fuel is replaced by a differing fuel without shutting down or depressurizing the gas generator. A two-section burner having a high turndown feature is employed that comprises a central conduit; a central bunch of tubes positioned in said central conduit; an outer conduit coaxial with said central conduit and forming an annular passage therewith; and an annular bunch of tubes positioned in said annular passage. A control system is provided for switching the type of reactant fuel streams flowing through either one or both sections of the burner. The flow rates of the oxidant, fuel, and temperature moderator streams may also be varied in either one or both sections of the burner, thereby effecting a rapid turndown or turnup of the burner and a change in the production of the effluent gas. See the Abstract.

With respect to claim 4, the Applicants respectfully submit that Lovercheck, Negishi, and Marion, either alone or in combination, fail to disclose or suggest the claimed features of the invention. Claim 4 recites a switching means that switches which of the first and second mixed water-methanol solution tanks is used as a fuel source according to conditions of operation of the methanol reforming apparatus. The Office Action took the position that the liquid alcohol storage tank 3 and additional

storage tank 44 of Lovercheck were comparable to the claimed first mixed water-methanol solution tank and second mixed water-methanol solution tank, respectively. The Office Action also took the position that the reactor 30 was comparable to the claimed reforming apparatus.

The Office Action stated that Lovercheck discloses a switching means 48 that switches the first and second fuel tanks tank 3 used as a fuel source according to the conditions of operation of the methanol reforming apparatus. In contrast, the Applicants respectfully submit that the additional storage tank 44 in Lovercheck is not switched to be used as a fuel source according to conditions of operation of the methanol reforming apparatus at least because, as shown in Figure 2, the contents of the storage tank 44 bypass the reformer 30. Specifically, Lovercheck discloses that when operating on gasoline, the valves 7, 14' and 20 are closed and the gasoline is fed through the line 2 through the fuel flow mechanism 23 to the engine 15. As such, the additional storage tank 44, containing gasoline, is not switched to be used as a fuel source according to conditions of operation of the reactor 30. Therefore, Lovercheck fails to disclose or suggest at least the combination of features of a switching means that switches which of the first and second mixed water-methanol solution tanks is used as a fuel source according to conditions of operation of the methanol reforming apparatus, as recited in claim 4.

The Applicants further submit that Negishi and Marion fail to cure the deficiencies in Lovercheck with respect to claim 4. Claim 4 recites an electronic control unit that controls the switching means so as to supply the mixed water-methanol solution from the second mixed water-methanol solution tank to the evaporator when starting and/or

stopping the methanol reforming apparatus. As noted above, the Office Action took the position that the additional storage tank 44 of Lovercheck was comparable to the second mixed water-methanol solution tank. The Office Action also took the position that it would have been obvious to one of ordinary skill in the art to modify the reformer of Lovercheck with the control means disclosed in Negishi and Marion to regulate the proper amount of each fuel to be fed the reformer and to allow more than one fuel to be used in the reforming process. See page 3, line 20 to page 4, line 2 of the Office Action. However, the Applicants respectfully submit that it would not have been obvious to modify Lovercheck in the manner suggested in the Office Action, at least because to modify Lovercheck to supply the gasoline in the additional storage tank 44 to the evaporator 8 would change the principle of operation of the reference. Under U.S. patent practice, if the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. In re Ratti, 270 F.2d 810, 123 USPQ 349 (CCPA 1959) See M.P.E.P. § 2143.01.

According to the Office Action's modification of Lovercheck, the gasoline in the additional storage tank 44 would be delivered to the reformer 30, instead of bypassing the reformer 30 as shown in Fig. 2 of Lovercheck, which changes the principle of operation of the Lovercheck.

Further, there is no indication that supplying gasoline from the additional tank 44 in Lovercheck to the evaporator would result in a successful operation of the fuel system in Lovercheck. Under U.S. patent practice, one of the three basic criteria that must be met to establish *prima facie* obviousness is that there must be a reasonable

expectation of success. In this case, there is no reasonable expectation of success that supplying gasoline to the reformer 30 in Lovercheck would start the internal combustion engine of Lovercheck.

Claims 10-12 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Lovercheck in view of Negishi and Marion as applied to claim 4 above, and further in view of Beshty et al. (U.S. Patent No. 4,670,359, "Beshty"). Lovercheck, Negishi and Marion were cited for disclosing many of the claimed elements of the invention with the exception of a second mixed water-methanol tank being an S/C control tank in which the molar ratio of water/methanol is controlled by utilizing water in the methanol reforming apparatus. Beshty was cited for curing this deficiency. Claims 10-12 depend from claim 4. The Applicants traverse the rejection and respectfully submit that claims 10-12 recite subject matter that is neither disclosed nor suggested by the cited references.

Beshty discloses that a water and methanol feedstock having a water/methanol mole ratio ranging from about 1.0 to about 10.0, preferably about 2.0 to about 9.0, and more preferably about 2.5 to about 4.0, is supplied via conduit 10 to vaporizer 11, wherein the water/methanol feed supplied thereto is heated to a temperature of about 200° to about 500° F. See column 3, lines 40-46. Beshty also discloses a fuel cell integrated with a steam reformer. The cooled reformat is passed from a condenser 22 via valve conduit 27 to a heat exchanger 31. Water separated out in the condenser 22 is passed into a collection tank 20 via a conduit 29 to provide some of the water for the methanol/water reforming reaction. See column 6, lines 26-32.

With respect to claims 10-12, the Applicants respectfully submit that the combinations of Lovercheck, Negishi and Beshty and Lovercheck, Marion and Beshty fail to disclose or suggest the claimed features of the invention. In particular, Beshty fails to cure the deficiencies in the combinations of Lovercheck, Negishi and Marion discussed above. Beshty fails to disclose a switching means that switches which of the first and second mixed water-methanol solution tanks is used as a fuel source according to conditions of operation of the methanol reforming apparatus. Further, Beshty fails to provide support for the modification of Lovercheck by Negishi and Marion, as the proposed modification to Lovercheck, suggested by the Office Action, would change the principle of operation of Lovercheck. Moreover, Beshty fails to provide a reasonable expectation that the operation of the modified fuel system in Lovercheck would be successful.

As such, the Applicants respectfully submit that Lovercheck, Negishi, Marion and Beshty, either singly or in combination, fail to disclose or suggest the features of the invention as recited in the claims.

Under U.S. patent practice, the PTO has the burden under §103 to establish a *prima facie* case of obviousness. In re Fine, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). Both the case law of the Federal Circuit and the PTO itself have made clear that where a modification must be made to the prior art to reject or invalidate a claim under §103, there must be a showing of proper motivation to do so. The mere fact that a prior art reference could arguably be modified to meet the claim is insufficient to establish obviousness. The PTO can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in

the art would lead that individual to combine the relevant teachings of the references. Id. In order to establish obviousness, there must be a suggestion or motivation in the reference to do so. See also In re Gordon, 221 USPQ 1125, 1127 (Fed. Cir. 1984) (prior art could not be turned upside down without motivation to do so); In re Rouffet, 149 F.3d 1350 (Fed. Cir. 1998); In re Dembiczak, 175 F.3d 994 (Fed. Cir. 1999); In re Lee, 277 F.3d 1338 (Fed. Cir. 2002). The Office Action restates the advantages of the present invention to justify the combination of references. There is, however, nothing in the applied references to evidence the desirability of these advantages in the disclosed structure.

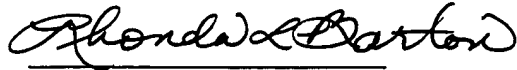
In view of the above, the Applicants respectfully submit that the Office Action has failed to establish a *prima facie* case of obviousness for purposes of a rejection of claims 4 and 10-20 under 35 U.S.C. § 103. Accordingly, the Applicants respectfully request withdrawal of the rejections, allowance of claims 4 and 10-20 and the prompt issuance of a Notice of Allowability.

Should the Examiner believe anything further is desirable in order to place this application in better condition for allowance, the Examiner is requested to contact the undersigned at the telephone number listed below.

In the event this paper is not considered to be timely filed, the Applicants respectfully petition for an appropriate extension of time. Any fees for such an extension, together with any additional fees that may be due with respect to this paper,

may be charged to counsel's Deposit Account No. 01-2300, **referencing Attorney Dkt.
No. 107439-00049.**

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Rhonda L. Barton". The signature is fluid and cursive, with the first name "Rhonda" being more prominent.

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